Appendix G1

Tiers 1, 2 and 3 Soil Vapor Intrusion Assessment

Former Willow Hawthorne Manufactured Gas Plant Site

This appendix describes the soil vapor intrusion (VI) assessment prepared for the Peoples Gas Light and Coke Company (PGL) Willow/Hawthorne Former Manufactured Gas Plant (MGP) facility based on the United States Environmental Protection Agency's (USEPA) *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)*, November 2002 (USEPA, 2002) and guidance provided by USEPA during a meeting with Integrys Business Solutions (IBS) on December 17, 2010. As recommended by USEPA in that meeting, multiple lines of evidence are provided for the proposed VI assessment consistent with the tiered assessment outlined in the USEPA guidance document (USEPA, 2002). The assessment includes:

- Tier 1 assessment findings, including source material composition and location, and identification of potential risks of indoor inhalation;
- Tier 2 assessment findings, including evaluation of available site data (measured and reasonably estimated concentrations of contaminants in groundwater and soil);
- Tier 3 assessment findings, including a site-specific assessment; and
- Assessment conclusions.

Tier 1 – Primary Screening

The primary screening questions are intended to help quickly screen out sites at which the VI pathway should not need further consideration. These questions lead to determination of the presence of potential risks of indoor inhalation due to vapor intrusion and, if present, whether immediate action may be warranted.

Q1. Are chemicals of sufficient volatility and toxicity known or reasonably suspected to be present in the subsurface?

Q1 Answer: Yes

A majority of affected soil at the site has been remediated. The General Iron and AFS parcels have generally been excavated to native clay in previous remedial actions. Additional excavation of surficial soils and some subsurface soils was completed on the western portion of the Marcey parcel, and the PGL parcel. A soil vapor extraction system was used on the PGL parcel to further mitigate subsurface effects on that parcel. Confirmation soil sampling data is available for these parcels and portions of parcels (Appendix J).

Limited groundwater data is available for this site. Five wells were installed on the General Iron parcel prior to site remediation. Two of the wells never produced water; the remaining three wells

were sampled once. Two temporary piezometers were also installed on the western portion of the Marcey parcel and sampled once prior to remediation.

Historic soil data from locations that were not remediated that indicate the presence of volatile organic compounds (VOC), semi-VOCs, polycyclic aromatic hydrocarbons (PAH), and inorganics in the subsurface at the site are located in Appendix J.

A site-specific list of contaminants of potential concern (COPC) for soil gas has been developed for the Willow/Hawthorne operable unit (OU) based on the standard list of soil gas COPCs for Integrys MGP sites (Appendix G2) and the volatility and toxicity of constituents detected in site soil and groundwater. Details of the site-specific screen for soil gas COPCs are presented in Appendix G3. The screening process evaluates whether a detected compound is both: 1) sufficiently volatile to result in potentially significant VI, and 2) sufficiently toxic to result in potentially unacceptable indoor air inhalation risks. If the compound fails either criterion, it is not considered further for this pathway. Results of the site-specific screening indicate the following compounds are soil gas COPCs for this site: benzene, ethylbenzene, toluene, xylenes, 1,2,4-trimethylbenzene, and naphthalene, 1,1,1-trichloroethane, 1,1-dichloroethane, acetone, carbon disulfide, methyl ethyl ketone (MEK), methylene chloride, styrene, tetrachloroethene, cis-dichloroethene, trans-dichloroethene and vinyl chloride.

The groundwater data currently available for the site is minimal, doesn't cover the entire site, and was collected prior to any site remediation. The groundwater COPC evaluation in Appendix F presents the list of COPCs that will be measured in groundwater. The presence and location of any groundwater impacts relative to building locations cannot be determined at this time, and so a network of wells will be installed to characterize groundwater at the site.

Q2. Are currently (or potentially) inhabited buildings or areas of concern under future development scenarios located near subsurface contaminants found in Table 1?

Q2 Answer: Yes

Based on USEPA guidance (November 2002, USEPA), buildings within or proposed to be located within 35-100 feet of subsurface contamination (depending on the presence of chlorinated compounds) should be considered candidates for vapor intrusion investigation. In addition, during the meeting with USEPA and IBS on December 17, 2010, USEPA suggested that any building located over a former MGP structure should be considered a candidate for VI investigation.

There are six buildings on site. These are:

- Building 1 – Industrial building located at the active ComEd electrical substation. No investigation or remediation has been done on this parcel. This building is located over a former MGP structure (holder);
- Building 2 – Smith and Hawken retail store located on the Marcey parcel. No investigation or remediation has been done on this parcel. This building is located adjacent to and south of a strip of land on the PGL parcel with affected sub-surface soils;
- Building 3 - Storage building west of Smith and Hawken retail store located on the Marcey parcel. No investigation or remediation has been done on this parcel, and it is located adjacent to the PGL parcel, which was partially remediated. The building is used as storage, only;
- Building 4 – Binny's Beverage Depot retail store located on the Marcey parcel. No investigation or remediation has been done on this parcel. This building is located over a former MGP structure (holder);
- Building 5 - Metal shed (open on the east side and with a small, modular, enclosed guard shack on each end) and gravel/dirt lot on the Demco Metals property, east of the AFS parcel. Remediation was conducted on the adjacent General Iron and AFS parcels and affected soil remains on these parcels; and

- Building 6 – Gold Naprapathic and Wellness Center (formerly the Transitions Learning Center), a holistic healthcare service center, located north of the AFS parcel and the Demco Metals property. No investigation or remediation has been done on this parcel. This building is located adjacent to the AFS parcel which has been remediated but where sub-surface affected soils remain.

Additional detail about these buildings can be found in Appendix G4.

Two buildings (Buildings 1 and 4) are located over former structures and an additional four buildings (Building 2, 3, 5 and 6) are located near or directly adjacent to affected soil or previously remediated areas, and/or are located in uninvestigated areas (Figure 13). All of these buildings are currently identified as located within an area of concern for VI and will be assessed.

Additional VI assessment will be considered following collection of site data as proposed in the 2011 Site-Specific Work Plan (SSWP), Rev 2. The groundwater data currently available for the Willow/Hawthorne OU is not sufficient to evaluate the proximity of buildings to impacted groundwater or the impact of groundwater on undeveloped areas of the property. Installation of a network of wells to characterize groundwater at the site is proposed in the 2011 SSWP, Rev 2. Additional soil sampling on the ComEd and Marcey parcels and off-property locations is also proposed in the 2011 SSWP, Rev 2.

Contaminant migration off site via preferential pathways is possible in bedding material for a gas line that runs east-west through the PGL property from Kingsbury Street to Marcey Street. This gas line runs through the area where a soil vapor extraction (SVE) system was installed as part of the site remediation, and affected soil remains on the parcel (Figures 8 and 9a). This gas line links to gas lines under Kingsbury and Marcey Streets. No data is currently available to evaluate these potential preferential pathways for vapor migration.

Q3. Does evidence suggest immediate action may be warranted to mitigate current risks?

Q3 Answer: No

No odors, hazardous atmospheres, or flooding have been reported in buildings on or near the site, nor have any physiological effects to building residents.

Tier 2 – Secondary Screening

The secondary screening questions are intended to allow rapid screening of available site data using measured or reasonably estimated concentrations of contaminants in groundwater and/or soil gas. Since available site data is in the form of contaminant concentrations in soil and groundwater from wells located near but not directly underneath the buildings of concern, this is considered to be reasonably estimated data and is sufficient for screening and comparison against generic screening levels. Other assumptions and limitations of this data are discussed below.

Q4: Are indoor air quality data available?

Q4 Answer: No.

Q4(c). Is there any potential contamination (source of vapors) in the unsaturated soil at any depth above the water table?

Q4(c) Answer: Yes.

There are instances of soil staining and concentrations of soil constituents that exceed residential soil standards in vadose zone soil located adjacent to site buildings (Buildings 2, 3, 5 and 6)

(Figures 8, 9a and 9b). Previous remedial actions removed affected soil and source material from the General Iron, AFS, and PGL parcels, but affected soil is known to remain on the PGL parcel near where an SVE system had been installed and used to mitigate subsurface VOC vapors. Soil at the ComEd and Marcey parcels has yet to be investigated or remediated, and two former holders are located on these properties.

Q4(g). Do measured or reasonably estimated soil gas concentrations exceed the generic target media-specific concentrations given in Tables 2(a), 2(b), or 2(c)?

Q4(g) Answer: Data not available to answer question.

No soil gas data has been collected at for this site and there is insufficient groundwater data to estimate soil gas concentrations on the Willow/Hawthorne OU.

Q4(h). Is the nature and extent of soil contamination adequately characterized and has an adequate demonstration been made to show that the soil gas sampling techniques used could reasonably detect an elevated concentration of vapors if they are present in the site setting?

Q4(h) Answer: No.

No soil data has been collected for the ComEd parcel, most of the Marcey parcel, or at off-property locations. Additional soil sampling is proposed in the 2011 SSWP, Rev 2, and further evaluation of buildings and future use scenarios that could be potentially impacted by VI from soil will be completed when sufficient data has been collected.

Tier 3 – Site-specific Assessment

Since the primary and secondary screening did not assist in excluding the existence of a vapor intrusion pathway for the identified buildings of concern, the guidance recommends a site-specific assessment. In addition, USEPA guidance presented during the meeting with Integrys on December 17, 2010, suggested that any building located over a former MGP structure should be considered a candidate for VI investigation and subslab soil gas sampling. The evidence presented in the above discussions, along with guidance from USEPA, is considered in a multiple-lines of evidence approach to selecting site-specific assessment techniques.

Q6(a): Have the nature and extent of contaminated soil vapor, unsaturated soil, and/or groundwater as well as potential preferential pathways and overlying building characteristics been adequately characterized to identify the most likely-to-be-impacted buildings?

Q6(a) Answer: No.

Six buildings have currently been identified for additional VI investigation. See the response to Q2 above. To evaluate the potential for VI impacts to indoor air at these six buildings, site-specific sampling is proposed. The need for additional VI assessment will be evaluated following collection of additional site data as proposed in the 2011 SSWP, Rev 1.

Contaminant migration off site via preferential pathways is possible in bedding material for gas and electric utility lines (see the response to Q2 above). The potential for off-property vapor migration through utility lines will be evaluated through site-specific sampling.

Q6(b): Are you conducting an Environmental Indicator (EI) determination and are you using an appropriate and applicable model?

Q6(b) Answer: No.

Q6(d): Are sub-slab soil gas data available?

Q6(d) Answer: No.

Tiers 1, 2 and 3 – Current Evaluation Conclusion

The Tiers 1, 2 and 3 VI evaluations performed to date according to the 2002 USEPA Guidance and the outcome of the December 17, 2010 meeting with USEPA and Integrys indicates additional assessments will be useful to evaluate potential soil vapor exposure risk. Current site data indicates that the potential VI pathway cannot be eliminated. For this reason, direct evidence (exterior soil gas and subslab soil gas data) and indirect evidence (soil and groundwater data), will be collected to further evaluate the VI exposure pathway as part of the Remedial Investigation (RI). Procedures for performing the following next steps are documented in the 2011 SSWP:

- Collect additional building information after gaining access;
- Collect exterior soil gas samples at Building 3, Building 5, and in gas utility bedding (Figure 13):
    - Building 3 - This unoccupied building is located on uninvestigated property (Marcey parcel) and adjacent to the PGL parcel, which has been partially remediated. The building does not lie over any former MGP structure and is currently being used for storage, only. Pavement from the parking and access areas around the building come all the way up to the exterior building walls on three sides of Building 3 (Marcey parcel sides). Course gravel covers the ground on the west side (PGL parcel side) of Building 3. Because Building 3 is currently being used as unoccupied storage only, the building will be surrounded with five exterior soil gas probes. These probes will be installed and sampled to characterize soil gas under the adjacent slab (pavement) and soil and estimate conditions underneath the Building 3. If proposed investigations on the Marcey parcel indicate that affected soils are adjacent to and likely underneath Building 3, subslab probes will be installed and sampled inside Building 3;
    - Building 5 – This building is located on uninvestigated property (east of the AFS parcel) and adjacent to the AFS and General Iron parcels, which have been remediated, but where some affected soils remain. The building does not lie over any former MGP structure. The rectangular building is a three-sided shed with small, modular booths on each end. Each booth has a door and windows on two sides, and a footprint of approximately 6 feet by 8 feet. The surface of the lot east of the building is gravel/dirt except for the paved ramp (with small apron) at the north end. The building and property are not currently in use. Two soil gas samples will be collected beneath the gravel/dirt pad to represent VI potential for future construction or activity at this location; and
    - Gas Line on PGL Parcel – This gas line runs east-west through the PGL property from Kingsbury Street to Marcey Street and links to gas lines under Kingsbury and Marcey Streets. This gas line runs through the area where a soil vapor

extraction (SVE) system was installed as part of the site remediation, and known contamination remains on the parcel (Figures 8 and 9a). Two soil gas probes will be installed and sampled to assess vapor migration along the gas line corridors; one at the confluence of the gas lines east of the PGL parcel in Marcey Street, and one at the confluence of the gas lines west of the PGL parcel in Kingsbury Street.

- Collect subslab soil gas samples in Buildings 1, 2, 4 and 6 (Figure 13):
    - Building 1 - This industrial/commercial building is located on uninvestigated property (ComEd parcel), however it is also located over a former 5,000,000 cubic foot gas holder. Per USEPA suggestion during the December 17, 2010 meeting with Integrys, two subslab probes will be installed and sampled under Building 1 to assess VI into the building;
    - Building 2 - This active retail building is located on uninvestigated property (Marcey parcel) and adjacent to the PGL parcel which has been partially remediated. The building does not lie over any former MGP structure, but it is located directly adjacent to the area where a soil vapor extraction (SVE) system was installed as part of the remediation on the PGL parcel, and affected soil remains on the parcel (Figures 8 and 9a). Two subslab probes will be installed and sampled in Building 3 to assess VI into the building;
    - Building 4 - This active retail building is located on uninvestigated property (Marcey parcel), however it is also located over a former 2,500,000 cubic foot gas holder. Per USEPA suggestion during the December 17, 2010 meeting with Integrys, five subslab probes will be collected under Building 4 to assess VI into the building; and
    - Building 6 –This active commercial building is located on uninvestigated property north of the AFS parcel. The adjacent AFS parcel has been remediated and some affected soil remains near the north border of the AFS parcel. The building does not lie over any former MGP structure. Two subslab probes will be installed and sampled in Building 6 to assess VI into the building.
- Collect additional soil and groundwater samples. No soil data has been collected for the ComEd parcel, most of the Marcey parcel, or at off-property locations. The groundwater data currently available for the site is minimal, doesn't cover the entire site, and was collected prior to any site remediation. The presence and location of affected groundwater relative to building locations cannot be determined at this time. Installation of a network of wells to characterize groundwater at the site is proposed in the 2011 SSWP, Rev 2, along with additional soil sampling. The need for further VI evaluation will be considered once the additional soil and groundwater are collected.